

Back Bay, North Landing River & Pocatoy River TMDLs First Public Meeting

February 27, 2013

Why Are We Here?

To discuss bacteria / low dissolved oxygen / and pH TMDLs for Back Bay, North Landing River and Pocaty River watersheds

Total Maximum Daily Load is how much pollutant can enter the stream and have the stream meet the water quality standards



What is a TMDL ?

Total Maximum Daily Load

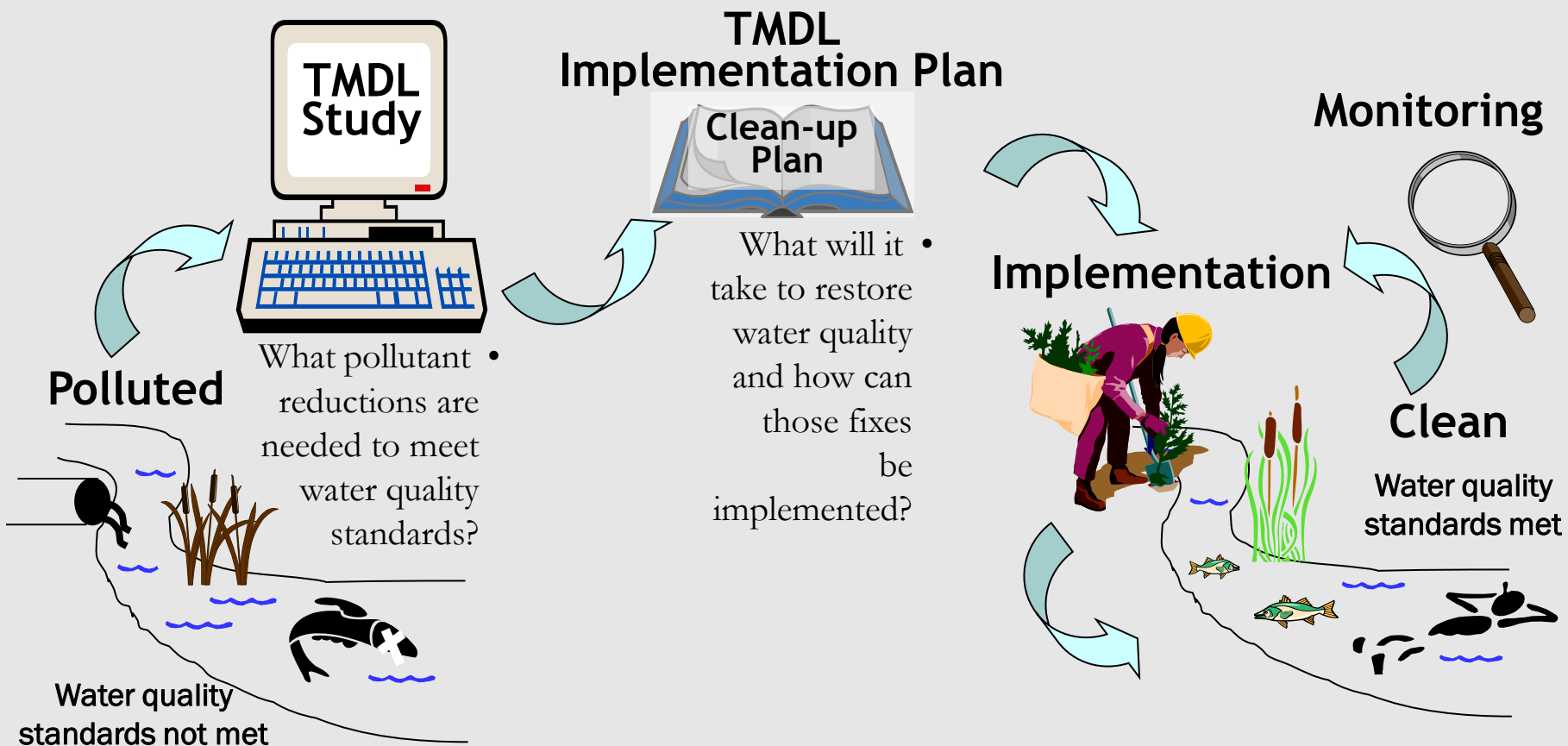
$$\text{TMDL} = \text{Sum of WLA} + \text{Sum of LA} + \text{MOS}$$

Where:

TMDL = Total Maximum Daily Load
WLA = Waste Load Allocation (point sources)
LA = Load Allocation (nonpoint sources)
MOS = Margin of Safety

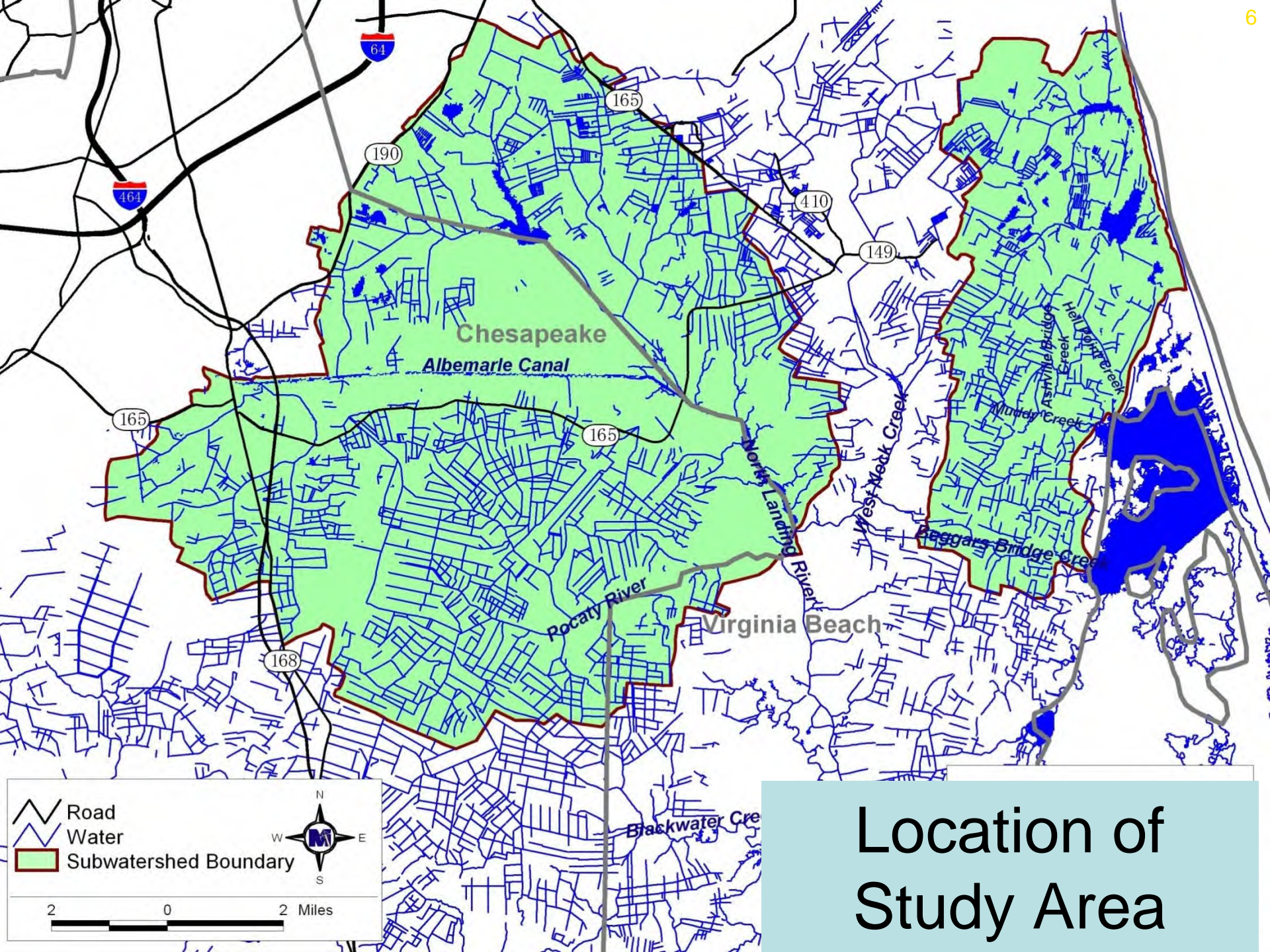
A TMDL is the maximum amount of a pollutant a water body can receive and still meet water quality standards.

Overview of TMDL Process



The Pollutants We Are Dealing With Here

- Excessive Bacteria
- Low Dissolved Oxygen
- pH



Location of
Study Area

Bacteria Impairments

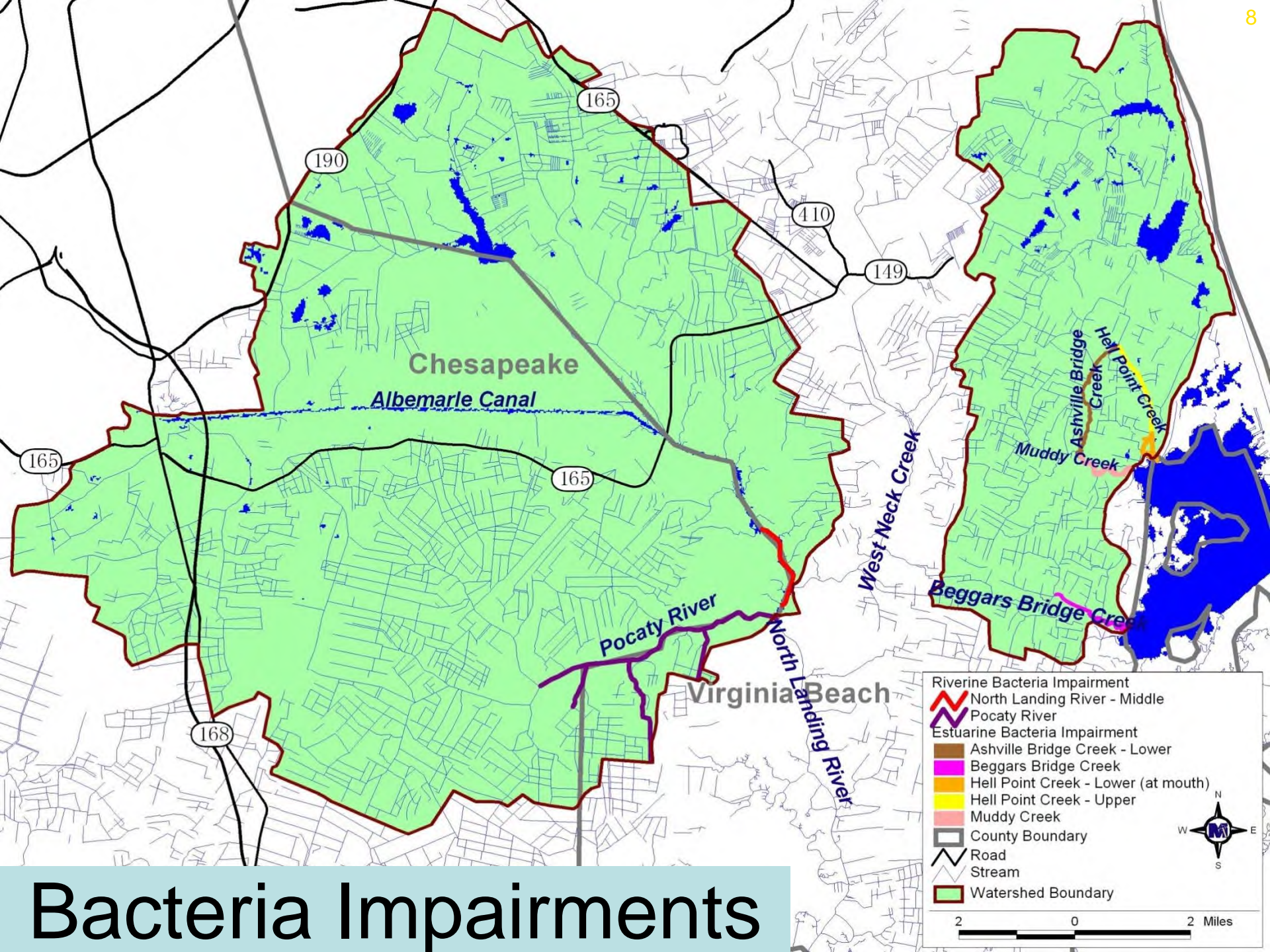
Stream Name Impairment ID	Impairment(s) Contracted	Initial Listing Year	2010 River Miles/ Square Miles ¹	2010 Listing Violation%	Impairment Location Description
Beggars Bridge Creek VAT-K42E_BBC01A04	Enterococcus	2004	0.033 ¹	31.4 Ent	From the confluence of numerous unnamed tributaries (RM 1.34) near Dawley Corners and extends downstream to the mouth at the confluence with Shipps Bay.
Hell Point Creek (Lower) VAT-K42E_HPC02A04	Enterococcus	2004	0.026 ¹	38.1 Ent	From the area at intersection of creek and canal upstream of monitoring station and ends at mouth, confluence with North Bay.
Hell Point Creek (Upper) VAT-K42E_HPC01A00	Enterococcus	2006	0.030 ¹	27.8 Ent	From the headwaters (west of Sandbridge) downstream to RM 0.73, intersection of creek with canal near mouth.
Muddy Creek VAT-K42E_MDY01A04	Enterococcus	2004	0.040 ¹	41.7 Ent	From the confluence with Ashville Bridge Creek to its mouth, at the confluence with North Bay.
Ashville Bridge Creek (Lower) VAT-K42E_ASH01A06	Enterococcus	2006	0.022 ¹	25 Ent.	From the lower portion of Ashville Bridge Creek, between Hell Point and Muddy Creeks.
North Landing River (Middle) VAT-K41R_NLR03A06	E. coli	2006	1.43	22.2 EC	From the area East of Fentress Landing Field , between confluence with West Neck Creek and Pocaty River.
Pocaty River* VAT-K41R_PCT01A02	E. coli	2012	7.24	14.7 EC	From the headwaters at river mile 3.92 to confluence with North Landing River at mile 0.00.

EC - Based on the interim instantaneous *E. coli* standard of 235 cfu/100 mL.

Ent - Based on the interim instantaneous *Enterococcus* standard of 104 cfu/100 mL.

¹Estuarine waters.

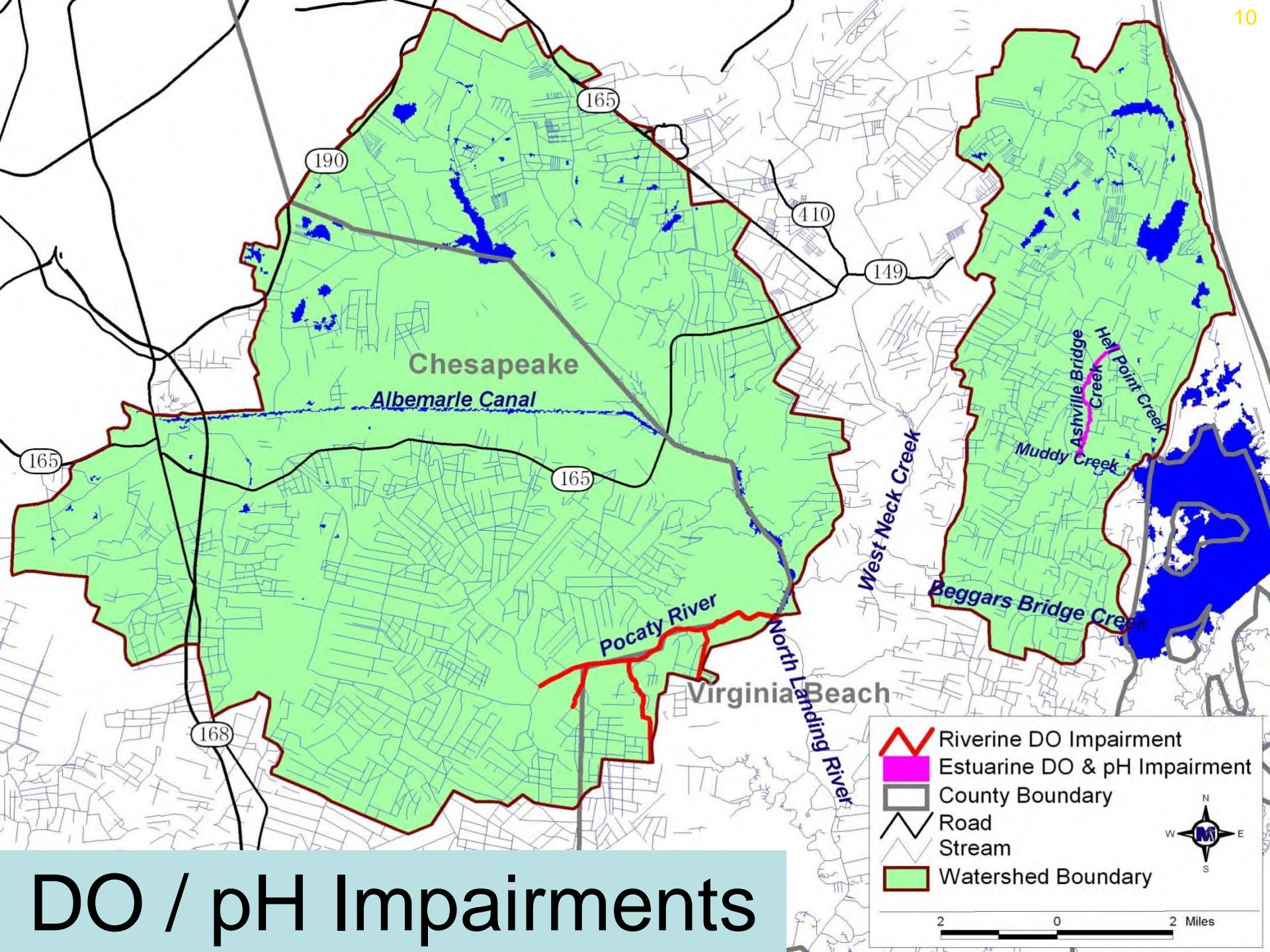
* New listing in 2012 Integrated Report



Dissolved Oxygen / pH Impairments

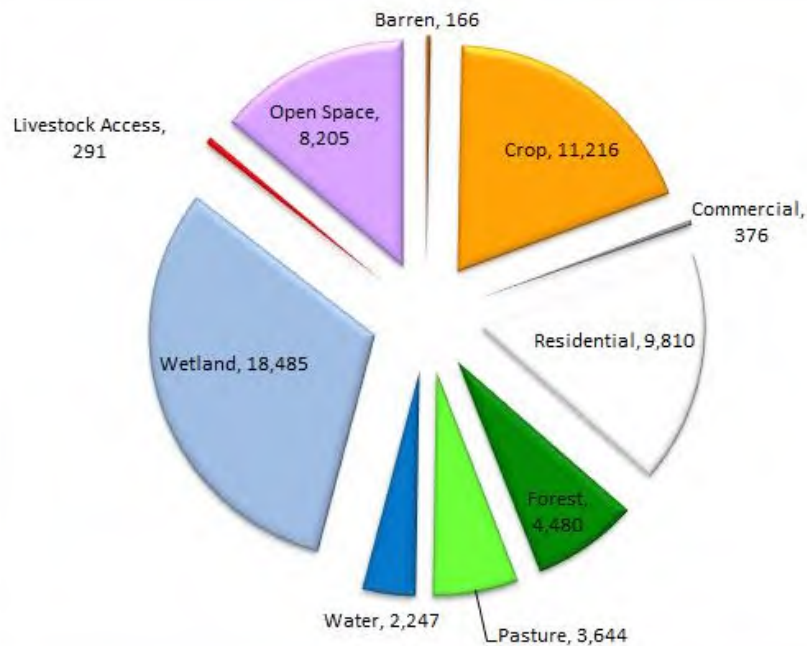
Stream Name Impairment ID	Initial Listing Year	2010 River Miles/ Square Miles ¹	2010 Listing Violation%	Impairment Location Description
Ashville Bridge Creek (Lower) VAT-K42E_ASH01A06	2006 2010	0.022 ¹	13.9 DO 11.1 pH*	From the lower portion of Ashville Bridge Creek, between Hell Point and Muddy Creeks.
Pocaty River VAT-K41R_PCT01A02	2002	7.24	44.4 DO	From the headwaters at river mile 3.92 to confluence with North Landing River at mile 0.00.

* New listing in 2012 Integrated Report

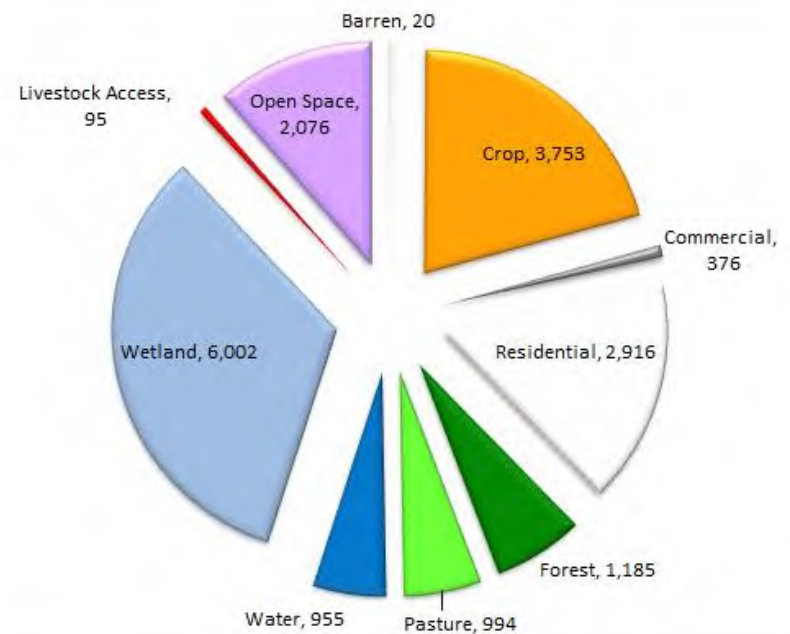


Land Use- Acres

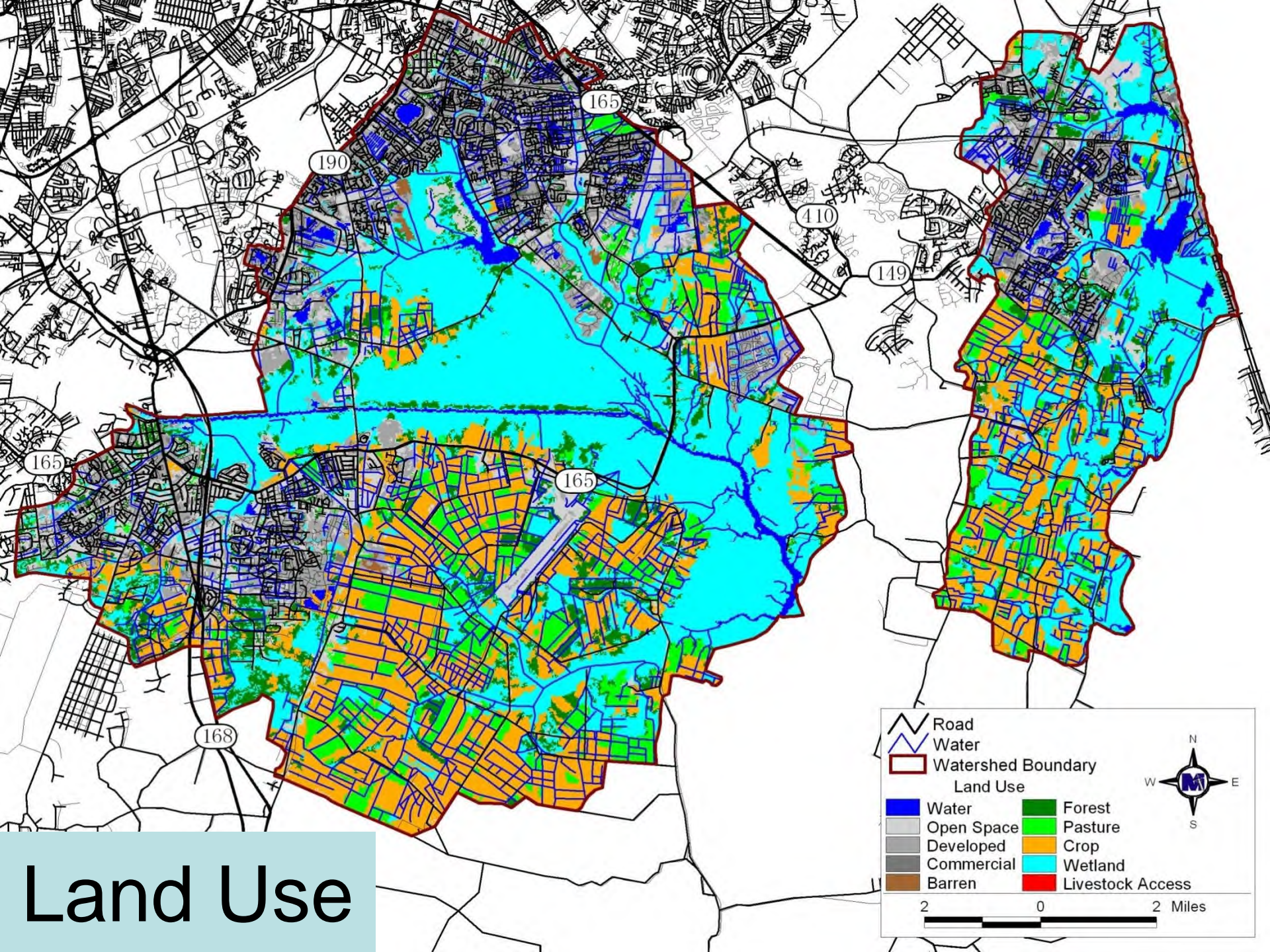
North Landing / Pocatuy Rivers
Acreage = 58,763



Back Bay
Acreage = 18,152



Sources of data is the 2006 Multi-Resolution Land Cover (MRLC) Data



Land Use

Water Quality Data Analysis

- Fecal Coliform (cfu/100mL)-

Stream	Station	Date	Count	Min.	Max.	Mean	Median	Standard Deviation	Violation % ¹
Ashville Bridge Creek	5BASH002.20	07/03 – 09/06	20	25	2000	246	63	471	15.0
Beggars Bridge Creek	5BBBC000.76	02/00 – 01/13	85	25	2000	216	100	429	9.4
Hell Point Creek	5BHPC000.00	05/00 – 01/13	65	25	2900	152	50	430	4.6
Hell Point Creek	5BHPC001.46	02/00 – 01/13	84	25	2000	184	75	415	8.3
Muddy Creek	5BMDY000.00	02/00 – 01/13	86	25	2200	240	100	456	12.8
North Landing River	5BNLR010.25	01/00 – 12/06	25	25	500	106	100	96	4.0
North Landing River	5BNLR010.75	01/00 – 12/06	25	25	580	130	100	148	8.0
North Landing River	5BNLR013.61	01/00 – 02/13	89	25	2000	118	50	261	4.5
Pocaty River	5BPCT001.79	01/00 – 02/13	82	25	2300	232	100	420	12.2

1 based on a fecal coliform water quality standard of 400 cfu/100 mL

Water Quality Data Analysis

- E.coli (cfu/100mL) -

Stream	Station	Date	Count	Min.	Max.	Mean	Median	Standard Deviation	Violation % ¹
Ashville Bridge Creek	5BASH002.20	07/03 – 05/04	6	10	400	148	115	138	16.7
Beggars Bridge Creek	5BBBC000.76	07/02 – 05/04	11	10	560	83	20	161	9.1
Hell Point Creek	5BHPC000.00	07/02 – 07/03	4	40	800	330	240	327	50.0
Hell Point Creek	5BHPC001.46	07/02 – 05/04	10	10	250	55	25	74	10.0
Muddy Creek	5BMDY000.00	07/02 – 05/04	11	10	380	71	25	116	9.1
North Landing River	5BNLR010.25	07/02 – 12/06	10	10	320	76	25	103	10.0
North Landing River	5BNLR010.75	07/02 – 12/06	10	10	700	154	25	258	20.0
North Landing River	5BNLR013.61	12/06 -02/13	65	10	2000	84	25	251	4.6
Pocaty River	5BPCT001.79	12/06 -01/13	58	10	1400	121	50	214	10.3

1 based on an *E. coli* water quality standard of 235 cfu/100 ml

Water Quality Data Analysis

- Enterococci (cfu/100mL) -

Stream	Station	Date	Count	Min.	Max.	Mean	Median	Standard Deviation	Violation % ¹
Ashville Bridge Creek	5BASH002.20	07/03 – 09/06	20	10	2000	224	25	469	25.0
Beggars Bridge Creek	5BBBC000.76	07/02 – 01/13	62	10	2000	321	50	629	30.6
Hell Point Creek	5BHPC000.00	07/02 – 01/13	53	10	1200	133	25	232	24.5
Hell Point Creek	5BHPC001.46	07/02 – 01/13	61	10	2000	217	50	474	24.6
Muddy Creek	5BMDY000.00	07/02 – 01/13	63	10	2000	355	75	653	34.9
North Landing River	5BNLR010.25	7/2/2002	1	10	10	10	10	NA	0.0
North Landing River	5BNLR010.75	7/2/2002	1	10	10	10	10	NA	0.0
North Landing River	5BNLR013.61	07/02 – 03/04	11	10	800	155	70	237	36.4
Pocaty River	5BPCT001.79	07/02 – 03/04	9	10	800	217	70	298	33.3

¹ based on an *Enterococci* water quality standard of 104 cfu/100 ml

Water Quality Data Analysis

- *Dissolved Oxygen*-

Stream	Station	Date	Count	Min.	Max.	Mean	Median	Standard Deviation	Violation %
Ashville Bridge Creek	5BASH002.20	8/2002 – 9/2006	42	2.28	13.89	6.97	6.3	3.0	14.3
Pocaty River	5BPCT002.16	4/2003 – 11/2003	2	0.8	5.2	3.0	NA	3.1	50
Pocaty River	5BPCT001.79	1/2000 – 3/2013	89	0.0	11.4	4.7	4.2	2.9	47.2

¹ Based on a minimum dissolved oxygen water quality standard of 4.0 mg/L

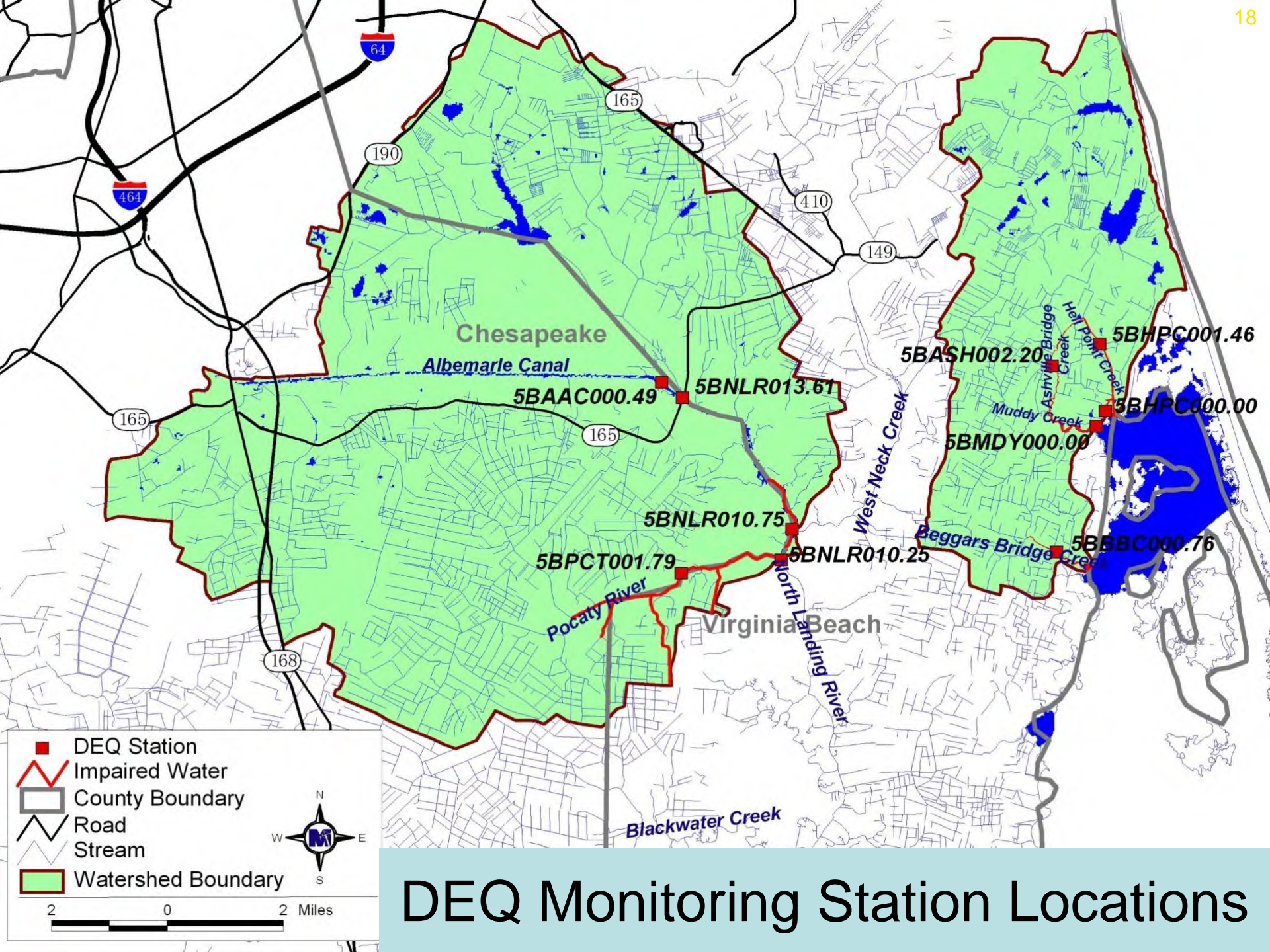
Water Quality Data Analysis

- pH-

Stream	Station	Date	Count	Min.	Max.	Mean	Median	Standard Deviation	Violation %
Ashville Bridge Creek	5BASH002.20	8/2002 - 9/2006	42	5.7	8.3	6.6	6.5	0.5	9.5%

¹ Based on a range of acceptable pH water quality standard between 6.0 and 9.0 SU

² The 2010 assessment violation percentage was 11.1%.



DEQ Monitoring Station Locations

Permitted Discharges

- Individual VPDES -

Permit No	Type	Facility Name	Receiving Stream	Design Flow (MGD)
VA0062391	Municipal	Indian Cove Resort Association Incorporated	Hell Point Creek	0.038
VA0081248*	Individual	HRSD - Atlantic Sewage Treatment Plant	Atlantic Ocean	36.03

*Associated with the biosolids application sites

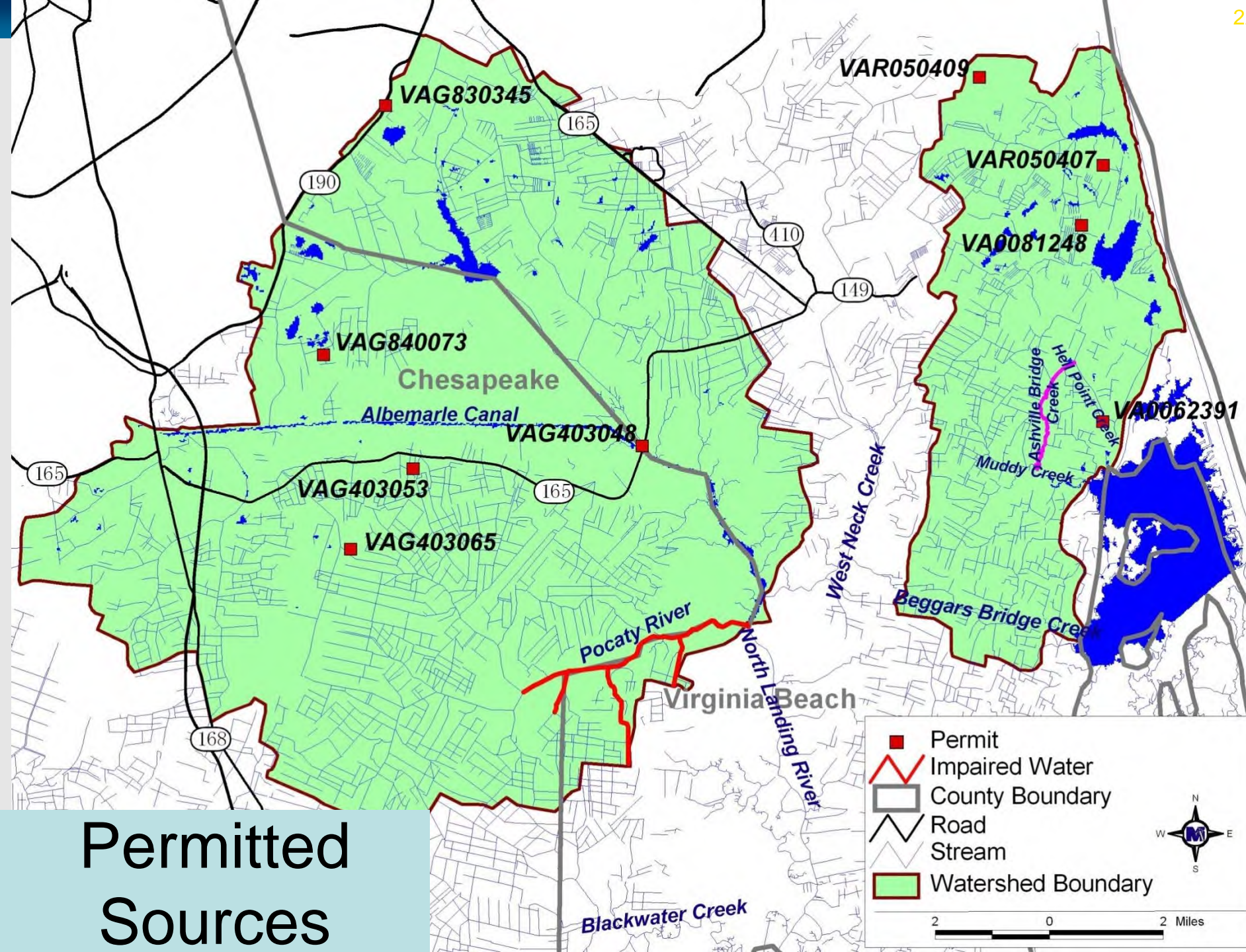
Permitted Discharges

- General Permits -

Permit Type	Permit No	Facility Name	Discharge / Design Flow (MGD)	Receiving Stream
Domestic Sewage	VAG403065	Battlefield Golf Club at Centerville	0.000095	UTRIB to North Landing River
Domestic Sewage	VAG403053	True Way Evangelistic Church	0.000075	Ditch to Intercoastal Waterway
Domestic Sewage	VAG403048	Residence	0.00005	North Landing River
Nonmetallic Mineral Mining	VAG840073	Elbow Road Farm Incorporated Borrow Pit	NA	Albemarle Chesapeake Canal
Stormwater	VAR050407	US Navy - NAS - Oceana - Dam Neck Annex	NA	Ditch to Redwing Lake
Petroleum Remediation Hydrostat	VAG830345	7-Eleven #24187		
Stormwater	VAR050409	Oceana Salvage - Anolia Recycling LLC	NA	Ditch/Canal/UTRIB to Redwing Lake

Permitted Discharges - MS4s -

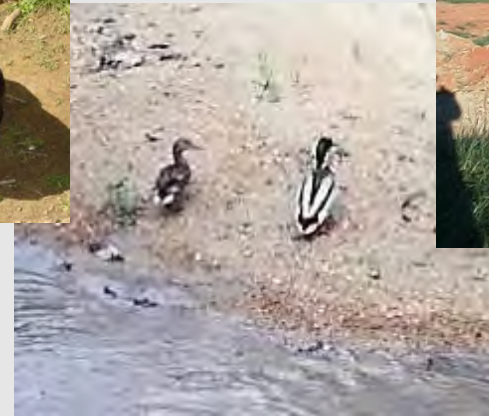
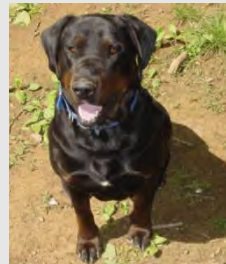
Permit Type	Permit No
MS4-Chesapeake	VA0088625
MS4-VA Beach	VA0088676

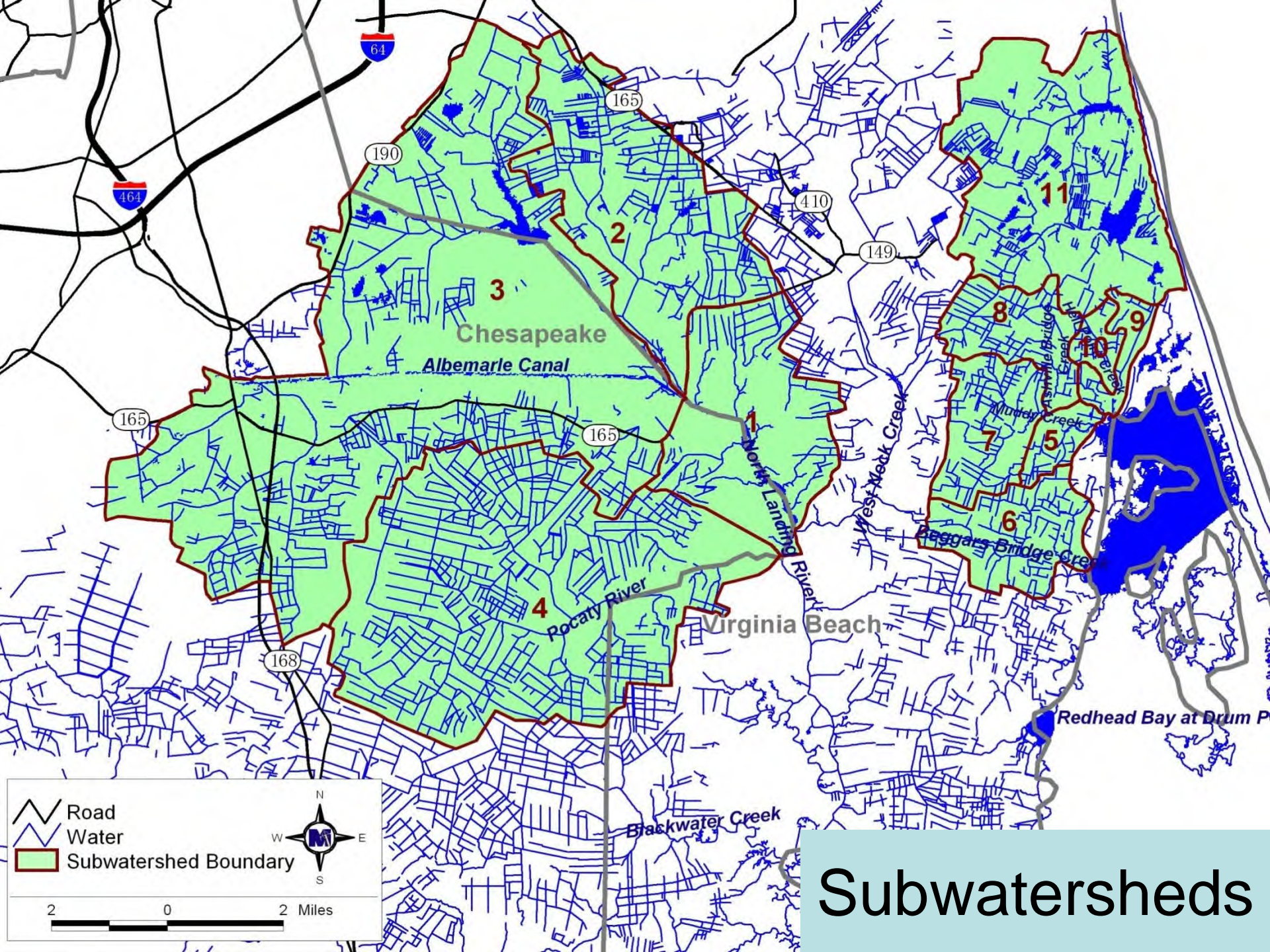


Bacteria Source Assessment

Source Assessment

- Conducted by subwatershed
- Permitted discharges
 - Wastewater treatment facilities
 - Other Permitted Discharges
- Human
 - Biosolids
 - Failed Septic Systems
 - Straight Pipes
 - Overflows
- Pets
- Livestock
- Wildlife





Subwatersheds

Human Source

Population, housing units, and onsite treatment system based on U.S. Census

■ Septic Systems

- Failure to soil surface throughout year or during wet season only
- Lateral movement continuously to stream
- Failing septic systems estimated by assuming that each septic system fails on average once in a 30-year expected life span

■ Straight Pipes

- Direct continuous input into stream
- Estimated using 1990 Census data with responders stating they have “other” sewer type

■ Biosolids

- Land-applied

Human Source

Subsheds	Population	Housing Units	Sewer	Septic	“Other”	Failing Septics
1	5,176	1,814	352	1,452	9	48
2	32,115	10,840	10,448	368	23	12
3	80,044	28,408	25,159	3,205	44	107
4	4,007	1,342	353	959	30	32
5	74	24	0	23	1	1
6	483	187	0	185	3	6
7	396	160	7	150	3	5
8	1,447	469	290	175	3	6
9	223	133	5	127	1	4
10	72	44	2	41	1	1
11	30,255	11,035	10,400	624	11	21
Total	154,292	54,456	47,016	7,309	129	243

Should “other” category be broken down into 10% straight pipes and 90% privies/outhouses?

Pet Sources

- Population/household based on literature values, veterinarians, and animal control
- Translated to housing units based on U.S. Census
 - 0.53 dog per housing unit
 - 0.6 cat per housing unit
- Land-applied

Pet Source

Subsheds	Dog	Cat
1	969	1,085
2	5,789	6,482
3	15,170	16,988
4	717	802
5	13	15
6	100	112
7	86	96
8	250	280
9	71	80
10	23	26
11	5,893	6,599
Total	36,566	40,949

Livestock Sources

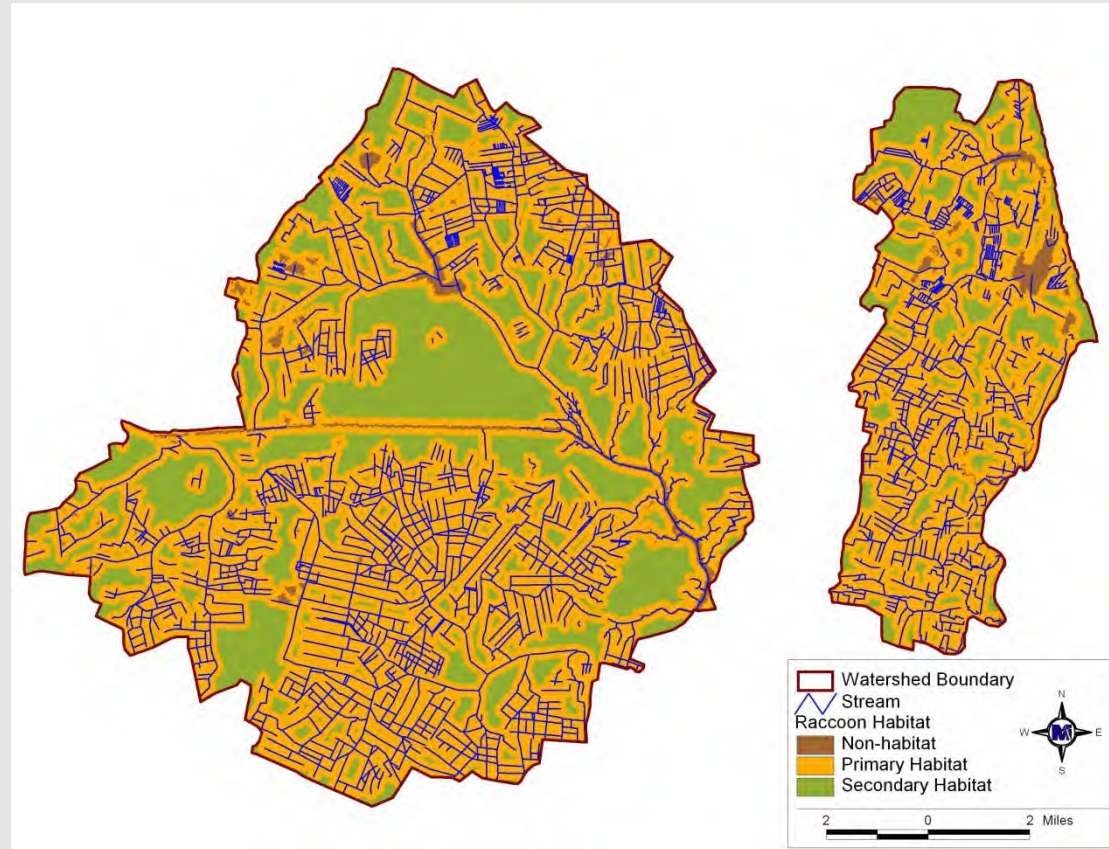
- Population
 - Virginia Agricultural Statistics
 - Consultation with SWCD, NRCS, VADCR, and VCE
 - Watershed visits
- Distribution of waste
 - Pastured
 - Confined, waste collected, spread
 - Direct deposition to the stream
- Seasonal varying applications

Livestock Population

Subshed	Beef	Beef Calves	Horses
1	21	20	16
2	8	7	34
3	140	140	60
4	492	491	24
5	1	0	1
6	2	2	18
7	4	4	17
8	4	3	15
9	0	0	0
10	0	0	0
11	3	2	11
Total	675	669	196

Wildlife Source

- Population
 - Animal densities from VDGIF biologists
 - Habitat from literature values and GIS
- Distribution of waste based on habitat
 - Land-applied
 - Direct deposition to the stream
- Seasonal variations based on migration patterns and food sources
- Example: If raccoon density were 0.01 animal per acre of habitat, and there were 10,000 acres of raccoon habitat, then raccoon population would be $0.01 * 10,000 = 100$ raccoon.



Wildlife Population

Subshed	Raccoon	Muskrat	Duck	Goose	Deer	Turkey	Beaver	Nutria ¹	Adult Nutria ²	Youth Nutria ²
1	399	838	17	9	189	44	200	838	371	1,326
2	538	1,415	29	14	240	30	405	1,415	213	760
3	1,884	3,516	73	36	877	135	825	3,516	341	1,217
4	1,156	3,318	69	34	562	137	879	3,318	453	1,619
5	47	139	3	1	23	6	33	139	42	150
6	183	546	11	6	90	23	137	546	32	116
7	160	488	10	5	78	19	134	488	--	--
8	141	441	9	5	69	16	114	441	52	187
9	51	134	3	1	25	6	29	134	73	262
10	37	106	2	1	18	4	25	106	56	198
11	592	1,268	26	13	261	35	331	1,268	267	954
Total	5,188	12,209	252	125	2,432	455	3,112	12,209	1,900	6,789

Two options for calculating Nutria are presented. Which one is more reasonable?

1 based on acreage of habitat, same as Muskrat

2 based on shoreline length with 3.5 adults and 12.5 youth per 1,000 ft of shoreline

How do we Determine the TMDLs?



+

Watershed data

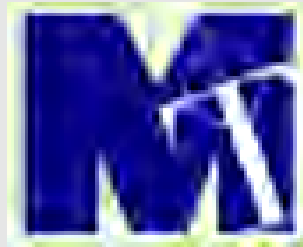


TMDL

And then:

- Conduct the Analyses
- Technical Advisory Committee meetings
- Public Meeting 2
- Public Review
- Submit to EPA
- State Approval





We appreciate that you're taking the time to come to the meeting



We appreciate your feedback

Public comment period begins February 28th, 2013 and ends March 29th, 2013.

Comments may be mailed, faxed, emailed (contact info on next page).

Presentation will be available at the DEQ web site at

[http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/
TMDL/TMDLDevelopment.aspx](http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL/TMDLDevelopment.aspx)

Contact Information

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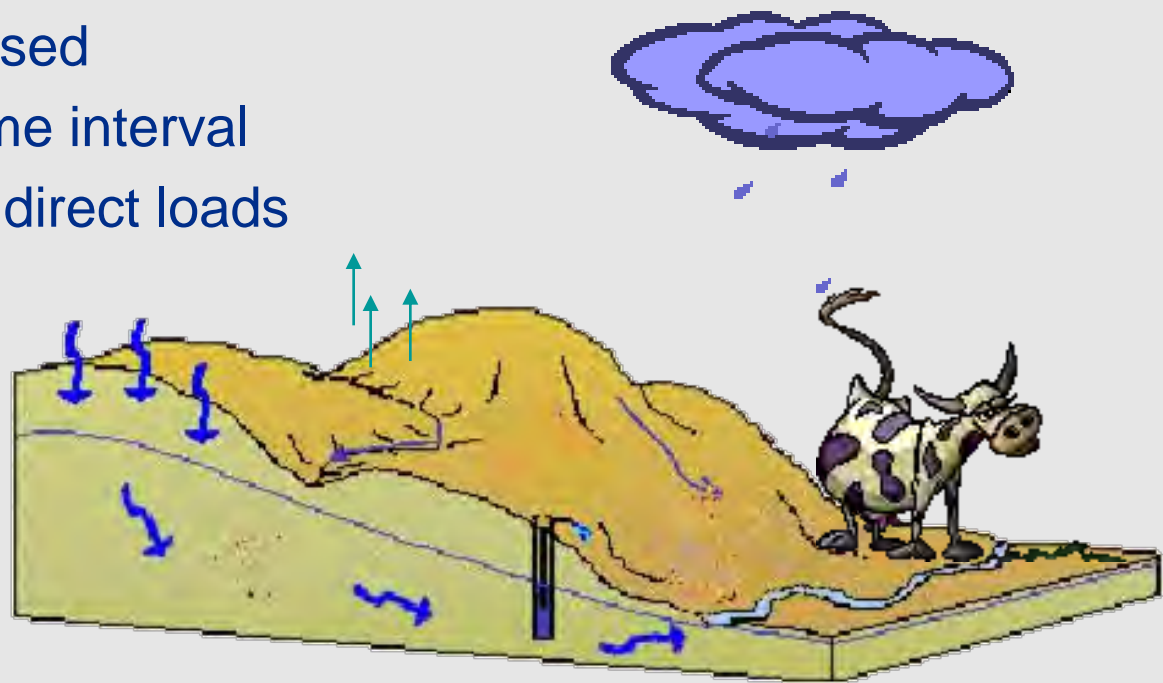
Appendix A

Modeling

Modeling - Bacteria

■ Rainfall-Runoff-Water Quality

- Hydrologic Simulation Program – Fortran (HSPF)
 - ◆ Watershed-based
 - ◆ Continuous time interval
 - ◆ Land-applied, direct loads



Conceptual Model



- Mathematical Representation
- Overland
- Direct discharges
- Withdrawal

